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MAY 13, 1940

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Contents

Contents of previous issues can be found by consulting the Industrial Arts Index at your library

• Special Articles

Dyeing of Artificial Fibers..... 241
J. E. Meili

Pectic Substance in Cotton and its Relation to the Properties of the Fiber 244
Roy L. Whistler, A. R. Martin and Milton Harris

• Departments

Trade Notes—New Products 258

Open Forum 262

• Proceedings of the American Association of Textile Chemists and Colorists

Calendar of Coming Events P245

The Dyeing and Finishing of Pile Fabrics P246
Barrett Fisher

Report, North Carolina State College Student Chapter.. P247

Semi-Resin Finishes P248
W. W. Trowell

One Hundred and Twenty-Seventh Council Meeting.. P250

Membership Applications P251

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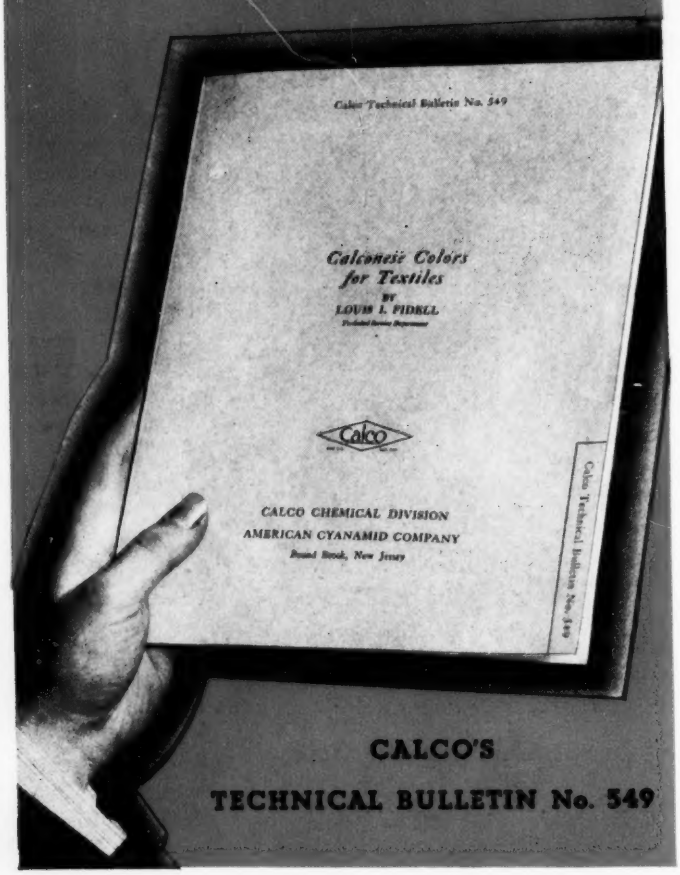
HERE'S PRACTICAL HELP IN DYEING ACETATE AND NYLON



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AMERICAN
DYESTUFF REPORTER

VOLUME 29 MAY 13, 1940 NUMBER 10

Dyeing of Artificial Fibers*

DR. J. E. MEILI**

TEXTILE fibers known to man since pre-historic times are wool, silk, cotton, hemp and linen. These, of course, are all natural fibers found in nature almost ready for use and they were, with a few other locally used fibers, the only materials used for textiles until the beginning of this century. The search for substitutes for the natural fibers, especially for silk, has been going on for a long time but it is only in the last twenty years that the ingenuity of man has produced synthetic fibers on such a scale that they seriously compete with the natural fibers and that they have completely revolutionized the dyeing industry.

Starting in the second half of the last century very slowly and timidly with nitro-cellulose, the development of new fibers went on with ever increasing momentum so that today silk is almost completely replaced except in the field of ladies' hosiery and cotton and wool have serious competitors.

The artificial fibers on the market today are viscose and cuprammonium rayon, acetyl-cellulose, animalized viscose, casein or more generally protein wool, and finally the entirely synthetic fibers like nylon and vinyon. The glass fiber may also be mentioned here as it takes on more and more importance in the textile industry.

The four fibers mentioned first are manufactured from cotton or wood pulp. The purified cellulose is in one way or another brought into solution and the viscous solution is forced through a fine nozzle or spinerette. The thread is pulled out, congealed and wound on bobbins. This seems very simple but the processes are really most complicated and the slightest chemical or physical variation gives a fiber a greatly different dyeing quality.

Of the fibers mentioned viscose and cuprammonium rayon are in their finished state regenerated cellulose. They, therefore, show similar dyeing qualities as cotton and can be dyed with the same dyestuffs. Acetyl cellulose rayon, as the name implies, is not regenerated cellulose but a cellulose acetic acid ester. The molecules actually contain approximately 40 per cent of the acetyl radical, corresponding to 50 per cent glacial acetic acid. Its chemical and physical properties are, therefore, entirely different from those of the cuprammonium and viscose rayons, and the dyeing of this fiber showed, when it first came on the market, seemingly unsurmountable difficulties. These were only overcome by the creation of an entirely new line of dyestuffs which are known as the acetate dyestuffs. Viscose, cuprammonium and acetate rayons are today the only artificial fibers that play a really important role in the American textile industry and we shall limit ourselves to the consideration of their dyeing problems. At this place, a short description of the other fibers may be given.

Animalized viscose, known under many technical names such as Cisalfa, Fibramine and others, is viscose containing a certain percentage of nitrogenous products which give it certain wool-like qualities. It can be dyed with acid colors but its behavior toward dyestuffs still resembles viscose and it is mostly dyed by the same dyeing methods.

In mixtures of Cisalfa and viscose rayon, the former can be dyed fast to washing, leaving viscose rayon undyed by the use of selected chrome colors. Fabrics of similar appearance, but not of the same degree of softness, can also be produced with viscose and acetate rayon mixtures.

Casein fiber has been developed in Europe with the idea to produce a substitute for wool. It is produced by dissolving milk casein in alkali, forcing the solution into an acid bath containing formaldehyde and salt. The fiber has some advantages over wool as for instance uniformity of length and fineness of thread. The greatest disadvantage is the low tensile strength, especially in a wet condition. Nevertheless if the manufacturing cost is low enough, there will be a field for casein fiber as diluent for wool for low priced garments with wool qualities. Casein fiber is sold in Europe under many trade names, according to the country of origin. In the United States it is best known under the Italian name of Lanital but it does not play as yet any important role. It has extraordinarily good affinity for the various groups of dyestuffs but it is never used by itself as its sensitiveness to water and moisture

*Presented before the American Association of Textile Technologists, April 3rd, 1940.

**Sandoz Chemical Works, Inc.

would make fabrics made from it unsatisfactory for normal requirements. It is mostly mixed with wool and as it dyes much darker than this fiber it is advisable to dye the two fibers separately. As chrome colors cause Lanital to harden, it is best dyed with milling colors or if special fastness is desired, with sulfur colors. The quality of casein wool suffers in boiling and it is best to dye it at a temperature not exceeding 175° F. A great number of dyestuffs show inferior fastness to water, milling and washing on Lanital than on wool. However, a group of dyestuffs of satisfactory fastness is available.

Lanital-wool or Lanital-rayon piece goods are best dyed on the jig; the former with specially selected acid dyestuffs and the latter with direct dyestuffs that have little affinity for animal fiber.

Nylon is a new, entirely synthetic fiber. It has many excellent and exceptional qualities and, therefore, seems to be destined to play a very important role in the textile industry. It is produced by polymerizing a mixture of certain diamines of the general formula NH_2 (CH_2) x NH_2 and dicarbonic acid of the type HOOC (CH_2) Y COOH. The resultant superpolyamide can be spun directly from the melt or from a solution. The fiber has affinity to direct and acid colors but is best dyed with acetate dyestuffs. Nylon has been on the market for approximately one year but has not as yet been produced in large enough quantities to play an important role. Its first field of importance seems to be in the line of ladies' hosiery where it threatens to drive silk from its last stronghold.

Vinyon is the newest resin fiber. It is produced by the polymerization of vinyl chloride and vinyl acetate. As yet it scarcely can be considered of real importance as a general textile fiber. The American Viscose Company claims that a full range of colored yarn can be produced by the addition of colored pigments to the resin dispersion prior to spinning just as it is done when the yarn is to be a dull yarn. On the other hand, they claim the yarn can be dyed by the use of solvents and non-solvents for the resin, which temporarily swell the filaments, or by means of many types of dyes using standard dyeing procedure modified, of course, as to temperature and by the use of a suitable dispersing agent for the dye, or by using oil soluble dyes applied from a hydrocarbon bath.

Glass fiber has to be dyed more and more frequently. As it has no affinity for dyestuffs, it is best dyed by coating it with a colored resin or lacquer.

The three most important fibers today are the viscose, cuprammonium, and acetate rayons. Of these, viscose and cuprammonium rayons are very similar in their characteristics, but differ largely in their affinity for dyestuffs. Almost all direct dyestuffs dye cuprammonium rayon much deeper than viscose rayon, and where we have a mixture of the two fibers, a fairly even shade can only be obtained by a most careful selection of the dyestuffs and special care in the dyeing operation. On the other hand, the difference in affinity is not sufficient to make cross-dyeing of the two fibers a real success.

Rayon is produced as bright and dull filament yarn and as bright and dull cut fiber or staple and spun rayon yarn and is processed as staple, as yarn, and as piece goods. Loose cut fiber can be dyed in the same machines that are in common use in the dyeing of loose cotton and wool. The following precautions, however, must be observed:

1. The machine should be packed rather loosely as rayon swells considerably when wet.
2. The staple must not be wetted out; the dye liquor must be introduced directly into the dry material.
3. The circulation of the dyebath should be in one way only, that is, from the inside to the outside.
4. The pressure of the pump should be low.
5. To prevent the caking together after dyeing, the dyebath is run off and the rinsing water is introduced at the same time.

Rayon is dyed in loose form principally when used for admixture to wool, and the dyestuffs are selected according to fastness requirements.

Rayon yarn can be dyed as skeins, as warp, or in package form. As the rayon coming from the twisting operation contains very little impurities, the yarn can be entered directly into the dyebath without any preliminary treatment. Skein dyeing is still performed on the box, but all kinds of available dyeing machines are in use. The dyestuffs most commonly used are the best leveling and cheapest direct dyestuffs. For special purposes, fast to light direct, sulfur, or vat dyestuffs are employed.

Rayon yarn for warps requires to be sized. Many sizes have been recommended and have been in use. At present a gelatine size is practically the only one employed on filament yarn, while in the sizing of spun rayon, gelatine as well as modified starches and resins are being employed.

The selection of the proper size and the greatest care and uniformity in the sizing operation are of utmost importance. Any variations in the tension of the yarn, too high temperature in drying, etc., may cause serious dyeing trouble and be the real reason for uneven, streaky, or blotchy goods.

A recently developed, inexpensive method of viscose and cuprammonium rayon warp dyeing is the combination of the dyeing and sizing processes. The operation can be carried on in a regular slasher. The necessary amount of good padding dyestuffs is added to the regular sizing solution, and the warp is run through the hot solution by means of a depression roll, then through the squeeze rolls and over the dry cans. This process does not only eliminate the skeining and winding operations, but it also greatly improves the weaving qualities of the warps.

Most of the viscose and acetate rayons are dyed in the piece; the piece dyeing is, therefore, of prime interest.

The grey goods received by the dyer should always be carefully examined before they are processed, not only as to fiber content but also as to construction, and a reference sample should be filed. The goods are then treated by different processes according to quality and usages of the

mills. Some goods have to be embossed, others need framing or calendering, and some spun rayon goods have to be singed; all qualities, however, have to undergo a desizing and shrinking operation commonly known as the boiling-off process. The boiling-off process varies greatly from quality to quality.

Some flat goods, as for instance taffeta linings, need only an enzyme treatment. Other goods, such as French crepe and Bemberg sheer and also some qualities of spun rayon, are given a caustic soda treatment, while others have to be shrunk in full width in a neutral bath, that is in a boiling soap solution or in a solution of sulfonated alcohol, etc. It is of course up to the dyer to select the proper method for each quality, but one difficulty may be mentioned here that shows up in the boiling-off process which cannot be blamed on the dyer. Very often one finds pieces where the edges roll in. This is blamed on tight selvedges. It is, of course, always a faulty construction of the goods. The defect can sometimes be ameliorated by pre-steaming and framing, but very often a redyeing is necessary, which does not only mean a loss to the dyer but the rehandling of the goods naturally has some lowering effect on its quality.

After boiling-off, the goods are dyed with dyestuffs that are selected according to fastness requirements. The goods for linings, for instance, are always dyed fast to perspiration. Light shade linings are often dyed by the padding method; dark shades are dyed on the jig or best by the combined padding-jig method. In this latter process the goods are padded near to shade and are then given a few ends on the jig where they can be shaded, also desized by the enzyme method, and where the color is fully developed. The advantages of this latter process are: saving of time, reducing of bar marks and warp streaks, no listing or dark selvedges, better penetration, and in cotton and rayon fabrics better uniformity in shade of the two fibers.

Viscose and acetate rayon crepes are dyed on the dye beck. For ladies' dress goods no special fastness requirements are demanded. It is advisable, though, to select dyestuffs that will stand a minimum of 10 hours' Fade-Ometer test. Acetate and viscose rayon goods are dyed with direct and acetate rayon dyestuffs in the same dye bath. The acetate dyestuffs are as a group faster to light and washing than the regular direct dyestuffs. Most acetate dyestuffs, though, are sensitive to burnt gas fumes. This is especially noticeable in shades requiring blue or violet dyestuffs.

The fading of acetate dyestuffs, also known as store fading and acid fading, has been a puzzling phenomenon for approximately eight years. Green, blue and grey dresses, that never had left the New York stores often showed a mysterious fading, and claims were made against the dyers. This fading was already in its early stages attributed to the influence of nitrous acid, but no explanation could be given as to how nitrous acid should be found in any store room. The problem was finally solved by Rowe and Chamberlain, who in a most thorough and interesting paper, published in "The Journal of the Society of Dyers and Colorists" in 1937, proved not only that nitric oxide was the cause of the fading, but also located the source of the gas in burnt gas fumes. When any combustion takes place, some nitrogen of the air combines with oxygen to nitric oxide, and though the amount is always small, it is sufficient to cause the fading of the dyes. So far we have no complete and satisfactory solution of this problem. There are, however, several ways to minimize its effects.

As the different acetate rayon dyestuffs show different degrees of sensitiveness, the dyer can select the dyestuff of greatest fastness. In addition to this, there are several inhibitors on the market that double to triple the fastness of the dyestuffs. By proper selection of the dyestuff and by using an antifume finish, the dyeings can be made satisfactorily fast for normal conditions. The colors, however, are only relatively fast.

We know definitely now that the fading is due to burnt gas fumes; it is, therefore, essential that all rooms in which dyed acetate goods are stored are kept free from combustion gases as much as possible.

The final solution of the problem probably lies in the creation of a new group of acetate dyestuffs. The total blame, though, does not lie with the dyestuffs alone but partly with the fiber itself. The same dyestuffs dyed on nylon or silk show excellent fastness to gas fading.

There exists much confusion regarding the fastness tests. The tests are best made by hanging a dyed sample in a chamber through which the combustion gases from a gas burner are conducted. The time is given in hours necessary to cause fading. One of the commercial testing laboratories gives a dyeing the rating of good if it stands in their particular chamber an exposure of 40 hours. Such a rating is in my opinion of very little value. A universal classification is desirable, and for this definite standards should be established.

One could, for example, compare a dyeing with a 1 per cent dyeing of a given dyestuff of poor fastness to gas fading, and if it shows the same fading give it the fastness of "1"; if it shows the same fading as Artisil Direct Blue 4GP, the fastness of "2"; and the same as a dye aftertreated with an anti-fume finish, the fastness of "3." Setacyl Discharge Blue 3G or Dianisidine diazotized and developed with B.O.N. would be "8." The intermediate numbers could also be filled. A standard similar to this should be adopted to enable any investigator to obtain comparable results. A given hour test is very confusing. It reminds one too much of an hour Fade-Ometer test. In light fading an hour Fade-Ometer listing is permissible as we have a standardized machine in the Fade-Ometer, but even there we have to resort to types for standard purposes.

Acetate rayon colors, especially acetate rayon blues and violets, are of greater brightness than the viscose colors. Nevertheless, the dyer is often asked to dye shades a bright royal for instance, on viscose rayon to an acetate rayon sample. This is simply impossible by the regular dyeing method. In some instances, it can be accomplished if the

converter is willing to pay the price by mordanting the goods with certain mordants, and dyeing with acid colors.

As the acetate rayon fiber is entirely different in its chemical and physical characteristics from all the other artificial and natural fibers, it is the fiber par excellence for cross dye effects. Cross dyeing is a subterfuge to imitate yarn dyed effects in piece goods. In acetate and viscose rayon mixtures one is able to produce any pattern and any color effects one desires with the greatest ease. If one has, however, mixtures of silk or wool, viscose and acetate rayon, the possibilities are limited as silk and wool have a strong affinity for acetate rayon dyestuffs.

There exists some confusion regarding the dyeing of spun viscose rayon and spun acetate rayon mixtures for men's sportswear. Nobody seems to know what fastness requirements should be demanded for this work, and some fantastic advertisements and guarantees regarding this line of work are being made.

If fastness to light of 50 hours' Fade-Ometer test and fastness to washing at 140° F. or even 160° F. is absolutely essential, then the goods have to be dyed with vat dyestuffs at exorbitant cost. In my opinion such fastness requirements are not necessary. The fastness requirements should not be set too high. The light to medium shades should be dyed with the relatively washfast, fast-to-light dyestuffs, and the dark shades with selected fairly light fast developed or formaldehyde dyestuffs. These goods are often given a waterproof or creaseproof finish, and these finishes improve the wash fastness to some extent.

Rayon printing does not offer any special difficulties. Rayon goods for white and discharge printing are mostly printed with vat colors by the same method as used for cotton goods. In the last few years, though, direct and acid colors are used more and more in application printing. Beautiful effects can thus be obtained that could not be imitated with vats.

All acetate and acetate-viscose flat goods can be printed with acetate or with vat colors. The discharge printing of acetate rayon is far more difficult. A complete list of acetate dyestuffs that can be discharged to a perfect white is available. Such discharge work is done to some extent, and very pleasing patterns can thus be obtained.

Acetate rayon crepe, however, can only be successfully discharged by partial or total saponification of the acetate rayon and dyeing the goods with dischargeable rayon dyestuffs. The saponification of the acetate rayon is accomplished by treating the goods in a solution of caustic soda or sodium carbonate or both. To obtain even results, the saponification has to be carried out most carefully. The easiest way to obtain even shades is to saponify completely. In doing so the acetate rayon loses 40 per cent in weight, that means that a 100 den. yarn becomes a 60 den. yarn. To preserve the characteristics of the acetate rayon fiber, however, the saponification should not be carried over 50 per cent. The saponified pieces are printed with vats and treated exactly as all rayon goods.

It would be of greatest interest if a workable method could be developed for the discharge printing of acetate rayon crepe.

Pectic Substance in Cotton

and its Relation to the Properties of the Fiber

ROY L. WHISTLER, A. R. MARTIN and MILTON HARRIS*

ABSTRACT

Pectic substance has long been known to be present in naturally-occurring cotton fibers. There exist, however, at least two divergent viewpoints regarding the location of this substance in the fiber. The differences in these viewpoints have led to very different conclusions regarding the influence of pectic substance on such important properties of cotton as tensile strength, moisture and dye absorption, and viscosity in cuprammonium hydroxide solutions.

The chief difficulty, heretofore encountered in attempts to evaluate more precisely the role of the pectic substance, has been the lack of a reliable method for its quantitative estimation in the presence of other carbohydrate material. Recently, however, a new method, which permits the accurate determination of small amounts of uronic acids in the presence of large proportions of cellulose, was developed in this laboratory. This development has made possible the present investigation, which concerns itself with the state of the pectic substance in native cotton fibers, its ease of removal by various reagents, its behavior in cuprammonium hydroxide solutions and its influence on the tensile strength and on the viscosity of cuprammonium dispersions of the cotton.

The results indicate that a pectin-cellulose complex does not exist in cotton fibers and that the pectic substance is present as an insoluble salt. The replacement of these ions, under non-hydrolytic conditions, by the monovalent cations, sodium or ammonium, renders the pectic substance soluble.

Cotton freed of pectic substance with alkali showed no change in tensile strength or in viscosity, whereas treatment of the fiber with acids, which removed only a small proportion of the pectic substance, produced an appreciable lowering of these two properties.

(Continued on page 253)

*Research Associates at the National Bureau of Standards, representing the Textile Foundation.

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MAY 13, 1940

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• CALENDAR • OF COMING EVENTS

Meeting, New York Section, Swiss Chalet, Rochelle Park, N. J., May 24, 1940. Speaker: C. A. Seibert, du Pont Co., "Atmospheric (Gas) Fading of Colored Cellulose Acetate."

Outing, New York Section, North Jersey Country Club, Paterson, New Jersey, June 7, 1940.

Annual Outing, Philadelphia Section, Seaview Country Club, Absecon, N. J., June 15, 1940.

Outing, Piedmont Section, Ocean Forest Hotel, Myrtle Beach, S. C., June 21 and 22, 1940.

Annual Meeting and Convention, auspices New York Section, October 18th and 19th, 1940, Hotel Commodore, New York City.

The Dyeing and Finishing of Pile Fabrics*

BARRETT FISHER**

MANY pile fabrics are ready for scouring and dyeing when they leave the loom. However some require a preliminary processing called "preparing."

PREPARING

Long pile fabrics require a steam carding to straighten out the pile before the cloth is wet out. If this were not done it would be impossible to obtain a good final finish. Examples of this type of cloth are mohair and rayon pile goods used by the toy trade.

Furniture fabrics, which have a short pile, require raw carding and shearing, only in the case of plain weaves. As is generally true in other types of cloth, defects are much more pronounced on plain patterns. Fancy weaves cover up minor faults and therefore do not require this preliminary treatment.

Some of the fabrics which have a pile composed of animal fiber are steamed before dyeing to set the pile while it is still in the proper position. This is roughly analagous to giving the pile a permanent wave.

SCOURING

The first wet process is scouring. This may be done either on the dye box or on a continuous machine. The latter method is more efficient for a large mill. If the scouring is done by the continuous method a low titer soap is used to promote easy rinsibility in the wash boxes. It is usually advantageous, when scouring mohair pile cloth, to add compounds to the soap bath which prevent the formation of lime soaps. Although our water is soft we find that considerable lime may be carried into the soap by the mohair itself. After scouring the cloth is ready for dyeing.

DYEING

Most fabrics are dyed on reel type boxes in the rope form. Some mechanical conditions must be recognized which are not important in the dyeing of flat goods.

1. Each end of a pile fabric piece has a separate identity, since the cloth has a natural lay to the pile caused by the weaving. When the cloth leaves the loom the ends of the piece are marked to indicate the direction of the pile lay. It is very important to load the cloth on the dye box so that the pile lies in the proper direction. As the reel pulls the cloth from the bath the dye liquor must flow back with the pile and not against it, otherwise the pile becomes wild and impossible to finish properly.

2. Heavy fabrics must be dyed in the open width to avoid creases. The most common fabrics of this type are used in making rugs for automobiles.

3. Fabrics in which the pile is not securely bound are tacked back to back to prevent the pile from being pulled out by the friction of the reel.

4. A high dyeing temperature must be avoided with mohair pile fabrics to prevent the pile from becoming wild and mushy in appearance. This precaution is not necessary when dyeing in an acid bath.

The type of dyestuff used is governed, in part, by the construction of the cloth. Furniture fabrics all have a cotton back. This is sometimes yarn dyed with sulfur or naphthol colors, when the pile material is entirely mohair. This type of cloth is box dyed with acid colors. The more common type of furniture cloth has a raw cotton back and mixed pile. These are union dyed, using a combination of neutral dyeing acid and direct colors.

Heavy shades are frequently cross dyed to improve crocking. In this case the animal fiber is usually dyed first with acid colors. The cotton is then dyed in a separate bath, at a low temperature, with direct colors. These should be selected from the group which does not stain animal fiber appreciably. Wool reserving materials are sometimes used in the bath to reduce staining, particularly when dyeing shades such as brown, in which it is difficult to find colors that do not tend to stain the animal fiber.

Cotton and rayon fabrics are usually dyed with ordinary direct colors. In some cases it is necessary to use developed or after-treated colors, for example when the cloth is to be discharged printed, to prevent bleeding onto the white in the wash after ageing.

The natural dyestuffs are used to some extent. Hudson seal, which has a tussah silk pile, is dyed with logwood on a chrome mordant. Logwood is also used for some blacks on mohair.

The general dyeing requirement for pile fabrics is fastness to light. Furniture fabrics must also be fast to crocking. Fastness to washing is not important in most cases.

PRINTING

A small proportion of printed production is in straight designs. Most of the printing, however, involves a novelty

*Presented at meeting, New York Section, March 29, 1940.
**Sidney Blumenthal Co.

effect either through the use of color or chemicals alone. The dyestuffs used are normally direct or neutral dyeing acid colors, depending upon the type of fiber.

Plain design printing is done on bus, automobile, cotton and furniture fabrics. Very often this is used as an inexpensive method of duplicating a woven design.

Ombre effects, in which the pile shades from light to dark, and tipping of the pile, either with a discharge or color paste, are among the more common types of novelty prints. These are largely used in the processing of woven furs.

Some effects are obtained by the use of chemicals alone. An imitation jacquard design is produced on cotton back-mohair pile furniture cloth by printing the back with a caustic soda paste, which destroys the mohair without harming the cotton. The dissolved mohair is then washed out. A similar effect is obtained on transparent velvets, which have a silk back and viscose pile, by printing with an aluminum chloride paste. The hydrochloric acid liberated in the dryer carbonizes the viscose without harming the silk. The carbonized pile is then brushed out. Mohair pile fabrics are sometimes printed on the face with a sulfocyanide paste before dyeing. This causes the pile to shrink and gives a bas-relief appearance to the cloth which is accentuated by the fact that the treated pile dyes a slightly different shade than the untreated.

FINISHING

Following are the more common mechanical operations used in finishing.

Wet and dry carding
Beating (to erect the pile)
Shearing
Pressing

If any chemical treatment is to be given to the cloth, this is applied in a quetch before the wet carding. The quetch may be a separate unit or it may be in line with the finishing equipment. Either squeeze rolls, vacuum extractors, or both are used to remove the excess solution.

Automobile fabrics receive no chemical treatment. Furniture goods may be mothproofed by running through the quetsch before finishing, if the mothproofing compound was not applied in the dye box.

Rayon and cotton fabrics are usually the only types that receive any variety of chemical treatment. Plain finishes are made with sulfonated oils, softeners, stiffening agents and the like, depending upon the finish desired by the customer. Special treatments include flameproof, waterproof and non-crush finishes.

Quite a variety of special finishes are obtained by rather simple methods.

Some of the new railroad coaches have seats upholstered with a pile fabric containing alternate blocks of cut and uncut pile. This pattern can be made by weaving on a wire loom but a much less expensive method is to emboss a plain loop pile fabric with the design, pressing down all parts of the cloth which are to retain the loops. The cloth is then run through a shearing machine set to just cut off the tops of the erect loops. When the cloth is wet out the embossed sections spring back to their original position. The height of the cut pile is, of course, slightly lower than that of the uncut pile when the pattern is made by this method.

Long pile cottons are sometimes cut out in various designs, such as squirrel skins. This is done by replacing the shear rest with a roll having a raised design. As the cloth goes through the shear the pile is cut only where it is raised up by the pattern on the roller beneath the cloth. This leaves a recessed effect in the finished cloth.

The following process is used to obtain a crush finish on rayon cloaking. This type of cloth is used for woman's coats. The cloth is wound, in rope form, on perforated drums. Steam is then blown through the cloth for several hours to set the pile. The crush effect is not permanent and is removed if the cloth is wet out.

Various designs are made by brushing the pile. This is done by passing the cloth, while damp, under a series of small brushes revolving in opposite directions.

Embossed patterns are frequently applied, sometimes in combination with the finishes previously mentioned.

* * *

In this talk I have tried to give a general, if sketchy, description of the dyeing and finishing of the more common types of pile fabrics. If flat goods are regarded as two dimensional we may consider pile fabrics as having a third dimension, namely height. Because of this characteristic, the processing of pile fabrics is, of necessity a slow and laborious operation.

DISCUSSION

Mr. Meltzer: What effect does the beating have on the crush resistant process during the finishing?

Mr. Fisher: I would say it had no effect at all.

Mr. Meltzer: Does the same apply to the flame-proofing and waterproofing?

Mr. Fisher: It might tend to soften up in the same manner as a button breaker.

Mr. Meltzer: Is it practically the same operation?

Mr. Fisher: No, beating is used only to erect the pile. The softening is incidental.

Mr. Meltzer: Normally do you use that process in all pile fabrics?

Mr. Fisher: In all erect pile finishes, yes.

REPORT, NORTH CAROLINA STATE COLLEGE STUDENT CHAPTER

JAMES E. GREER, representing American Aniline Products Inc., spent two days at North Carolina State College, lecturing and demonstrating on naphthol colors, and supervising experiments by students in the laboratory.

Respectfully submitted,

WILLIAM S. PEARSON, *Secretary*.

Semi-Resin Finishes*

W. W. TROWELL**

MOST of you have read the paper, "Semi-Resin Finishes for Cotton Piece Goods,"† presented at the Annual Meeting, Boston, Massachusetts, September 15, 1939. This paper reviewed semi-resin‡ finishes for cotton piece goods, beginning with their development, originally, in the laboratories of the Hercules Powder Company, and their further evaluation and development in textile mills, mostly from the standpoint of backfilling finishes.

A summary of this prior discussion will provide an excellent background for our comments today. Despite the fact that synthetic resins have been used for some time for certain selected applications of textile finishing, only recently have synthetics been combined with orthodox finishing ingredients to obtain semi-resin finishes. This development has been made possible by the introduction of the new type of semi-plastic resins which show exceptional compatibility with starches, softeners, mineral oil, waxes, gum, gelatin, latex, sulfonated oils, and other materials commonly used in finishing.

The excellent stability of emulsions of these resins both alone and in combination with the above mentioned ingredients, makes it possible to produce a wide variety of semi-resin finishes which show marked utility in the finishing of cotton piece goods.

A description of the advantages to be gained by the use of these finishes, based on considerable mill experience, is the purpose of this discussion today. During the early stages of the use of these types of resins, it was generally felt that because they could be included in the starch sizing mixes or formulas without materially altering the sizing cost per yard of fabric finished, in some cases even lowering the cost of sizing finish, these resins would find ready acceptance for finishing. Today, however, we find that this assumption is not the chief reason, by any means, for the increasing use of these resins by textile mills. We find, now, that the use of these types of resins favorably affects sizing or finishing costs in two ways:

1. By increasing the quality of the finish while maintaining or only slightly increasing current sizing costs.

2. By maintaining the prevailing standards of quality of the finish, and lowering or equalling the sizing cost.

These new thermoplastic resins have been widely adopted by textile finishing plants for producing better backfilled fabrics. Ease of application, tough film forming properties, stability to heat, light and ageing, translucency—all help in producing a more uniform and more stable backfilled finish. For these reasons a more detailed description of these advantages are therefore in order.

1. *Increased Filling Efficiency.* Fabrics show a better closed appearance. Cloudiness or chalky appearance is eliminated. A more even distribution of the size in the fabric is obtained.

2. *Reduction and Elimination of Dusting.* By the use of these resins talc or clay is bound into the finish so that when the fabric is crushed or placed under a strain, the inert material does not fly out. Many times when observing the calendering of a heavily backsized fabric, so much of the inert materials will fly out of the fabric that a certain amount of fogginess or haziness, due to the dust clouds, can be observed in the atmosphere immediately adjacent to the calender machine, resulting in loss of weight causing sleazy appearance. A backfilling size containing these resins when calendered will not exhibit this negative characteristic, assuming, of course, that the sizing is properly formulated and properly applied.

3. *Fuller and More Pliable Hand.* By this is meant that fabrics containing these resins are more flexible. When handled, they will not crack to promote dusting. Also the finish in these fabrics adds thickness. The sense of fullness is obtained without oversizing with starch.

4. *Does Not Reduce Color Value.* Starch films containing these thermoplastic resins are more translucent, vastly more so, than a straight starch film, so that little difficulty is experienced in maintaining full color value or as it is sometimes expressed, color yield. In many cases this factor has resulted in the use of less color in the backsized mix in order to match the back and face of the fabric.

5. *Simplifies Backfilling Mixes by Eliminating Gum, Waxes and Binding Agents.* This is one of the most interesting observations that have been made by the mills from an operating standpoint. Because these resins contribute definite bodying characteristics, contribute pliability, and also add considerable binding action, it has been found that in a majority of sizing mixes or formulas, that most of the commercial softeners, waxes, and binding agents can be eliminated. Although they cannot be eliminated in all cases, they can be reduced to a minimum. Many textile mills have found it a burden to carry in stock a great variety of materials for finishing formulas. There

*Presented at meeting, Piedmont Section, Februarv 10, 1940.

**Synthetics Dept., Hercules Powder Company.

†American Dyestuff Reporter *28*, 22, P643.

‡The Soft Thermoplastic Synthetic Resin discussed in this paper is manufactured by Hercules Powder Company, and is known by the trade name, "Textac" (Reg. U. S. Patent Office).

has been such a complexity of formulations in the last few years that mills are realizing that their best economic interests are served by simplifying such finishing formulations wherever possible. These resins definitely contribute to achieving this objective.

6. *Reduces Reruns.* When using the ordinary starch mixes for backfilling, it is not at all an uncommon occurrence to rerun a batch of fabric. Often the heavy starch size contributes too much chalky appearance, and in such cases usually results in too much breaking out of the finish to pass inspection. Mill experience utilizing these thermoplastic resins in backfilling formulations or mixes shows that mills have had little occasion to make reruns, for the reason stated.

7. *The Semi-Resin Backfilling Finishes Do Not Wash Out Nearly as Readily as Do The Ordinary Starch Mixes.* They are more uniform. In one instance, an A.A.T.C.C. specification for a Sanforizing laundry wash test resulted in a loss of 92 per cent of the ordinary starch backsized filling. A semi-resin starch backfilling size on this same fabric showed a loss of only 32 per cent, in one sanforizing wash test, conducted by the same standards.

8. *Increases Tensile Strength.* This is achieved in many cases due to the elimination of softeners that otherwise permit the fibers to slip one over the other, and also due to the inherent binding action of these resins when properly mixed with starch in the backfilling size.

The trend toward the use of semi-resin finishes in pure finishing is based, thus far, in their values for this use, as follows:

1. Thicker hand, more full, more leathery finish.

2. Uniform softness, without loss of body. By this is meant it is possible to maintain body and handle without necessity of overloading with starch.

3. More difficult to wash out.

4. Simplifies finishing mixes by eliminating majority of softeners, waxes, and binding agents. This advantage tends toward increased tensile strength, for the same reason as was shown when discussing this point from the standpoint of backfilling mixes.

5. Brighter and increased color value.

6. Favorably affects cost. By utilizing the Semi-Resin finishes for pure finishing, greater opportunity is available to improve finish at lower cost. However, it is to be again stressed that superior quality finishes have been obtained, at equal, or slightly increased cost, warranting the adoption of these types of pure finishes.

Summary:

These new thermoplastic semi-resin finishes have been adopted by textile mills largely for the following reasons:

1. They replace waxes, gums and other agents used to bind the filler to the cloth, thus simplifying formulae and inventories, and eliminates dusting. This makes possible a fuller, softer, more pliable finish.

2. These finishes are more translucent, give better color value, having a superior, clothier hand.

3. These semi-resin finishes make possible a thicker finish without sacrificing pliability.

4. Semi-resin finishes do not require overloading with starch to retain fillers.

5. Semi-resin finishes are more uniform, crack less easily, and yield brighter shades.

6. These finishes are better filled and therefore have better hand and appearance.

7. These semi-resin finishes simplify the processing of varied constructions of cloth in the mill, thus in most cases favorably affecting cost.

8. There is no danger of undesirable odors developing.

9. Their ease of application does not make necessary any change in present mill equipment.

These semi-resin finishes not only contribute to superior finishing of cotton piece goods, but are also finding application on other types of fabric as spun rayon, continuous filament rayon piece goods, the construction of carpets, bagging, automobile cloth, and other specialty fabrics.

The textile industry for the last several years has been asking for resinous or semi-resinous finishes having the characteristics as these described. These thermoplastic semi-resinous finishes are outstanding in answer to this demand for sizes of these types, having the necessary compatibility with currently used finishing compounds. These resins represent a more fundamental development than simply providing something to maintain current finishes at low cost, even as fundamental as this is in itself. In these new synthetic resins, the industry has available new, superior finishing agents that are well within economy of finishing costs in view of the quality of the finishes that may be obtained by their use.

DISCUSSION

Mr. Sandridge: What is the method of application of synthetic resins and the temperatures required?

Mr. Trowell: The application of these resins does not vary from that of established mill procedures. As these resins are not curing type, the drying temperature is not critical.

Q: Do these resins give a semi-permanent finish?

Mr. Trowell: These resins when used in conjunction with starches and softeners naturally do not give a permanent finish. Some of these resins give a semi-permanent finish—the degree of permanency depending upon the amount of water soluble ingredients present in the mix.

Dr. Rupp: Do they continue to cure or polymerize on ageing?

Mr. Trowell: Finished fabrics have been tested over a period of several months without showing any appreciable change on ageing. The resins referred to in this paper are not curing type resins.

Dr. Rupp: Does it matter how you add them to the mix?

Mr. Trowell: The time of addition has a very important bearing on the finish obtained with resins. With backfill mixes, in order to maintain high viscosity, it is

best to add resins after bringing starch mix to the boil. With pure finishes it is best to add resins after mixing ingredients have been cooked.

Q: Have you noticed any tendency to tendering of fabrics?

Mr. Trowell: We ran a test for some time on strength. This was done in 1938—we took an 8 ounce duck fabric and sized it and watched it for a period of three months. We did not notice any weakness of the cloth.

Q: Have these been used in Sanforizing?

Mr. Trowell: Yes—no difficulty is experienced during Sanforizing.

ONE HUNDRED AND TWENTY-SEVENTH COUNCIL MEETING

THE Council held its 127th meeting at the National Bureau of Standards in Washington, on Friday morning, April 19, 1940. Present were President Carl Z. Draves, presiding; Arthur R. Thompson Jr., Vice President; William R. Moorhouse, Treasurer; Louis A. Olney, Chairman of the Research Committee; William H. Cady and P. J. Wood, Past Presidents; Kenneth H. Barnard and Walter M. Scott representing Northern New England; J. Robert Bonnar, (carrying proxy) and Harold W. Stiegler representing New York; Charles A. Seibert, William A. Stringfellow and Herbert S. Travis representing Philadelphia; A. Henry Gaede and Raphael E. Rupp representing Piedmont; Robert W. Philip (carrying proxy) representing the Southeastern Section; Bertil A. Ryberg, Associate Director of Research; and Harold C. Chapin, Secretary. The Secretary's report of the 126th Council meeting and balance sheet of April 13, and the Treasurer's report of April 18, were accepted. A report from the Treasurer of the Southeastern Section was approved.

Affirmative letter ballots were received from over two-thirds of the members of the Council, amending the By-Laws as follows:

To make Article II, Section 4, read: "The fiscal year of the Association shall begin August first, but the dues year November first. All dues shall be payable in advance. A Senior, Junior or Associate member elected after May first shall be credited with $1.50, out of the $5.00 received with his application, toward dues of the next dues year."

To make Article II, Section 6, read: "A member whose dues are in arrears on January first of any year shall have notice sent him, and unless payment be made by February first, he shall cease to have any privilege or right in the Association. Such member may however be reinstated by vote of the Council during the dues year in which he has been suspended, after full payment of his dues for that year. During a later year a former member may be reinstated by vote of the Council after he has paid current dues and discharged all previous indebtedness to the Association. Current dues plus any indebtedness for dues of a previous year shall be considered $6.25 for a member applying for reinstatement before May first, or $5.00 after May first, except for a member reinstated as Student, to whom the charge shall be $3.75 before or after May first."

Change Article X, Section 4, second paragraph to read: "Each Section may request through the Secretary of the Association, in any year beginning May first, sums not exceeding a total of $1.00 for each Senior, Junior or Associate member in good standing in the Section, with dues to the Association fully paid on that May first. On receiving such request,—(etc., without further change).

Henry F. Herrmann was appointed by the President to serve as Chairman of the new Committee on Publicity. Mr. Ryberg presented a summary of his activities since the last meeting, and was elected Associate Director of Research.

It was voted that the next Council meeting be in Boston on Friday, June 21.

Each of the following was elected to the class of membership specified, as of thirty days from publication of application, provided no objection be received meanwhile by the Secretary.

Senior

J. E. Akers	V. T. Giardino	S. Mooradian
G. S. Aldrich	H. C. Gift	K. G. Morton
L. E. Anderson, Jr.	W. A. Green	R. C. Moseley
	J. L. Grizzell	R. S. Neal
M. M. Anderson	K. E. Gyory	M. Y. Parker
B. L. Appel	L. B. Hagenbuch	C. A. Peterson
F. A. Beevers	G. W. Hopkins	T. J. Platt
C. E. Bergamini	D. Houghton	B. O. Ranck
J. K. Berry	F. P. Jecusco	G. A. Rawcliffe
H. L. Blackwell	W. R. Katzell	L. H. Roane
A. O. Bradley	W. L. Katzenmoyer	H. Robinette, Jr.
E. B. Brearley		G. Rogers
H. D. Caldrice	H. M. Kaufman	R. A. Schaefer
H. M. Comer	D. P. Ketner	W. F. Sheriff
E. C. Diehl	J. W. Kriessman	R. C. Smith
A. T. DiMasi	D. E. Kualnes	C. E. Sparks
H. F. Durand	A. Lang	O. Stallmann
W. Floersheim	J. W. Lang	R. E. Sumner
S. G. Ford	A. Mantz	T. H. Vaughn
T. F. Geisser	D. R. Meikle	A. V. Ward
L. W. Gerst	R. J. Mitchell	F. Willis

Junior

P. D. Applegate	J. M. Hallmark	J. E. Pirie
W. N. Gerard	B. C. Jackson	A. G. Rios
R. C. Carr	W. C. Livingston	G. R. Robinson
M. C. Dasso	T. A. Martone, Jr.	H. L. Sager
J. M. Dennis	G. W. Miller, Jr.	H. N. Schladt
R. F. Fritz	H. J. Monahan	H. Schneider
H. G. Gendreau	B. J. Morway	L. J. Sheehan
G. C. Graham, Jr.	R. I. Peters	C. A. Ventura
F. P. Greenspan	A. A. Petrone	G. P. Whitcomb

SECRETARY'S BALANCE SHEET—April 13, 1940

	Applications	*Dues, regular and Reinstate.*	*Dues, Corporate and Sustain.*	*Miscellaneous*	*Bank charges*	*Totals*
Brought forward and received by Secretary, to Jan. 20, 1940	$500.00	$5,623.42	$2,325.00	$353.84	—$2.42	$8,799.84
Received by Secretary, Jan. 20 to Apr. 13, 1940	555.00	2,365.12	15.00	347.62*	— 2.10	3,280.64
Total received	1,055.00	7,988.54	2,340.00	701.46	— 4.52	12,080.48
Transmitted to Treasurer	970.00	7,906.54	2,340.00	628.16		11,844.70
Leaving to order of Secretary	85.00	82.00		73.30	— 4.52	235.78

MISCELLANEOUS ITEMS*

Year Books	$246.65	Crock-meter profits	45.05
Reporters	1.20	Crock-meter cloth	11.98
Button	1.50	Worsted tubing	33.30
Dyed standards	7.94		$347.62

Associate

F. Alberte	R. S. Glover, Jr.	R. Mulligan
D. H. Alexander	P. H. Helie	A. L. Munson
F. J. Chadwick	F. E. Hilger	F. G. Portz
H. M. Collier	F. B. Hillhouse	F. G. Roux
M. H. Cone	F. L. Jones	D. L. Scheer
P. T. Delmarle	H. N. Kopple	J. E. Whetstone
G. G. Denny	T. J. LaFontaine	H. B. Whiting
F. E. Geisler	N. J. Miller	

Student

D. Y. Buckingham	E. Hungerford	C. E. Schiffer
J. F. Cairns	J. T. Jones	J. Soroka
G. M. Dabrowski	G. S. Leary	R. W. Sumner
C. P. Echerd	R. R. Long	F. J. Szymosek
J. J. Fitzgerald	T. F. Parks	S. Tager
J. C. Gilman, Jr.	W. S. Pearson	A. R. Williams, Jr.
N. A. Hamel	D. J. Shaw	L. J. Winiaski

C. J. Horne was transferred from Junior to Senior membership.

Respectfully submitted,

HAROLD C. CHAPIN, *Secretary.*

LAPEL BUTTONS

These buttons, bearing the seal of the Association, can be purchased by members in good standing from the Secretary at $1.50 each.

MEMBERSHIP APPLICATIONS

Senior

Hugh Moss Comer—Vice President, Avondale Mills, Sylacauga, Ala. Sponsors: W. F. Crayton, R. W. Philip.

Dorothy Houghton—Instructor in Chemistry, Teachers College, Columbia University, New York, N. Y. Sponsors: J. R. Bonnar, W. L. Swenson

N. Judson Miller—Representative, Synthetics Dept., Hercules Powder Co., Charlotte, N. C. Sponsors: H. E. Kiefer, Jr., W. W. Trowell.

Ralph C. Moseley—Overseer of Dyeing, Texas Textile Mills, McKinney, Texas. Sponsors: H. E. Knox, S. I. Parker.

Thomas James Platt—Textile Superintendent, Swansea Print Works, Swansea, Mass. Sponsors: S. I. Garnett, G. Garnett.

Junior

George C. Graham, Jr.—Asst. Chemist, Clearwater Mfg. Co., Clearwater, S. C. Sponsors: G. H. Smith, A. N. Henschel.

Bernard C. Jackson—Laboratory Asst., Sandoz Chemical Works, Inc., Boston, Mass. Sponsors: H. J. Sheehan, H. A. Ross.

Associate

Frank Alberte—President, Refined Products Corp., Newark, N. J.

Grace G. Denny—Professor of Home Economics, University of Washington, Seattle, Wash.

Student

Donald Young Buckingham—North Carolina State College. Sponsor: A. H. Grimshaw.

Charles P. Echerd—North Carolina State College. Sponsor: A. H. Grimshaw.

Arthur R. Williams, Jr.—North Carolina State College. Sponsor: A. H. Grimshaw.

Gordon S. Leary—Lowell Textile Institute. Sponsor: L. A. Olney.

Clifford E. Schiffer—Lowell Textile Institute. Sponsor: L. A. Olney.

Unemployment Register

Members of the association who are without employment may obtain from the Secretary, or the American Dyestuff Reporter, application blanks for the Unemployment Register. Personal histories and employment records of applicants may be examined by prospective employers.

Twentieth

ANNUAL MEETING AND CONVENTION

HOTEL COMMODORE

NEW YORK CITY

OCTOBER 18TH AND 19TH, 1940

General Chairman

PATRICK J. KENNEDY

DECORATION COMMITTEE

Roland Williams

Victor Froelicher

Auspices of

NEW YORK SECTION

H. R. TISDALE
Chairman, Decoration Committee

H. R. TISDALE, sales manager and a director of the American Dyewood Company, will be chairman of the committee on decorations for the twentieth annual meeting and convention. Mr. Tisdale has been an active member of the New York Section for many years and is at present chairman of its technical program committee. With the aid of his able committee members, whose names appear at the left, members and guests are assured that the decorations will be in keeping with the best spirit of the occasion.

Pectic Substance in Cotton

(Continued from page 244)

When dewaxed fibers were dispersed in cuprammonium solutions, it was found that a small portion remained insoluble and was readily removed in a centrifuge. Analysis of the material showed it to consist practically entirely of pectic substance. Similar results were obtained on fibers which had been pretreated with concentrated hydrochloric acid. Consideration of these results led to the conclusion that the pectic substance does not contribute to the viscosity of cuprammonium dispersions of cotton. Determinations of the viscosities of cuprammonium solutions to which had been added several samples of pectic material from different sources substantiate this conclusion.

I. INTRODUCTION

POLYURONIDES in the form of pectic substance* have long been known to be present in naturally-occurring cotton fibers. The current concepts regarding the location of this substance *in situ,* indicate at least two divergent viewpoints. Anderson and Kerr[1], for example, have recently presented evidence based on staining reactions and solubility tests which indicates that the pectic substance is restricted to the primary wall. On the other hand, Farr and Eckerson[2] stated that they believed the pectic substance to be the material covering the cellulose particles, the cellulose fibrils, as well as the fiber itself. The differences in these concepts necessarily led to very different conclusions concerning the influence of the pectic substance on many of the important properties of cotton.

Since the experimental evidence on which the previous viewpoints were based was essentially of a qualitative nature, it appeared that more precise information concerning the role of the pectic substance could only be obtained by a quantitative approach to the problem. The principal difficulty heretofore encountered in attempts to do this has been the lack of a reliable method for the quantitative estimation of the pectic substance in the presence of other carbohydrate material. Recently, however, a new method[4] was developed which permits the accurate determination of small amounts of uronic acids even in the presence of large proportions of cellulose. This development has made possible the present investigation, which concerns itself with an examination of the state of the pectic substance in native cotton fiber, its ease of removal by various reagents, its behavior in cuprammonium hydroxide solutions, and its influence on such important properties of the cotton as tensile strength, and fluidity in cuprammonium hydroxide solution.

*In the present paper the term pectic substance is used to denote that carbohydrate component of native cotton which is characterized by the presence of uronic acid groups.[3]

II. MATERIALS AND METHODS

The cotton used in these experiments was furnished by the Bureau of Agricultural Economics, United States Department of Agriculture. It was of the Missdel-7 variety, grown at the Delta Experiment Station at Stoneville, Mississippi, and had been ginned and twice carded but had received no chemical treatments.

The cotton was dewaxed by extraction with cold alcohol and with ether for 24 hours each. The dewaxed cotton had a copper number of 0.18, a cuprammonium hydroxide-fluidity of 0.95 rhe, a tensile strength of 89,300 pounds per square inch, and a uronic acid-content equivalent to 2.4 mg. of carbon dioxide per gram of cotton. On the basis of these analysis, it may be considered to represent a high grade natural cellulose.

The copper numbers were determined by a modification[5] of the Schwalbe-Braidy[6] procedure. In order to insure more uniform contact of the cellulose and reagent, the fibers were ground in a laboratory Wiley mill until they passed through a number 20 screen.

Most of the measurements of the fluidities of the dispersions of cotton in cuprammonium hydroxide solutions were made according to the recommendations of Mease[7]. This procedure is essentially that set forth by the Fabrics Research Committee (London)[8] except that the higher concentration of ammonia originally recommended by Clibbons and Geake[9] was used. The cuprammonium hydroxide solution contained 240 $\pm$ 5 g. of ammonia (NH_3), 15 $\pm$ 0.1 g. of copper, and 1 g. of sucrose per liter. The concentration of nitrite was less than 0.5 per cent. In the present paper this solution will hereafter be referred to as cuprammonium hydroxide solution A. All measurements were made on 0.5 per cent dispersions of cotton at 21° C.

In some of the experiments, a second cuprammonium hydroxide solution, prepared according to the specifications set forth by the Division of Cellulose Chemistry of the American Chemical Society[10] was used. This solution contained 30 $\pm$ 2 g. copper, 165 $\pm$ 2 g. of ammonia and 10 g. of sucrose per liter. The concentration of nitrite was less than 0.5 per cent. In the present paper this solution will hereafter be referred to as cuprammonium hydroxide solution B.

Uronic acid determinations were made according to the method developed by Whistler, Martin and Harris[4]. This procedure depends upon an examination of the rate at which carbon dioxide is evolved from a sample during treatment with a boiling solution of 12 per cent hydrochloric acid. The results are recorded either as milligrams of uronic acid-carbon dioxide per gram of material or as

percentage pectic substance. The latter value was obtained by multiplying the value for carbon dioxide in per cent by the factor 4.8[4].

Tensile strength measurements were made by the improved Chandler bundle technique*[11].

III. EXPERIMENTAL RESULTS AND DISCUSSION

1. Extraction of Pectic Substance from Cotton by Different Reagents

The experiments listed in this section are concerned with a variety of treatments to which cotton fibers have been subjected for various purposes in the course of several different investigations in progress in this laboratory. Accordingly the conditions are not strictly comparable and furthermore no attempt was made to remove all of the pectic substance with each of the reagents used. However, the application of the new method for the determination of uronic acids to the treated samples has made it possible to evaluate quantitatively the efficiency of the different reagents, and for that reason, it appeared advisable to include the results in the present paper.

(a) *Sodium Hydroxide.* The treatment of cotton with a boiling 1 per cent solution of sodium hydroxide has been recommended[12] for the preparation of standard cellulose. In an earlier investigation[4] it was found that cotton purified in this manner is free from uronic acids. In order to study the efficiency of the removal of pectic substance under these conditions, samples of cotton were similarly treated for different lengths of time. The procedure was essentially the same as that described by Corey and Gray[12], except that the apparatus of Worner and Mease[13] was employed. The extreme rapidity with which these solutions remove the pectic substance from cotton is shown by the uronic acid determinations in Table 1 and Figure 1. Since the carbon dioxide-rate curves for the samples treated for periods of one-half hour or longer are the same and no longer exhibit the initial rapid rise, characteristic of uronic acids, it appears that removal of the pectic substance is essentially complete in a half hour. The good agreement between the data for the sample treated for periods of one-half hour or longer is indicative of the reproducibility of the results obtained by this method.

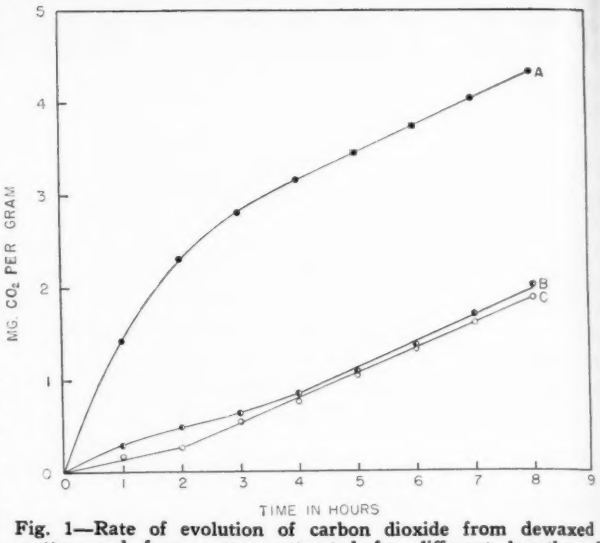


Fig. 1—Rate of evolution of carbon dioxide from dewaxed cotton and from cotton extracted for different lengths of time with a boiling 1 per cent solution of sodium hydroxide. Curve A represents the rate of evolution from raw dewaxed cotton; curve B, the values for a sample treated for 10 minutes, and curve C the value for samples of cotton treated for 0.5, 2, 4 and 7.5 hours. The points for these samples on curve C were so close together that only one set is plotted in the figure.

Cold solutions of sodium hydroxide were much less efficient in removing the pectic substance from the cotton. This was demonstrated by immersing samples for 20 hours in a 1 per cent solution of sodium hydroxide at 30° C. The usual precautions to exclude oxygen from the system were taken. The alkali solutions were always saturated with nitrogen and kept under nitrogen during the time they were in contact with the fiber. After these treatments, the samples were thoroughly washed with a cold, 1 per cent solution of acetic acid and then with water. Analyses showed that the sample still contained an amount of uronic acid equivalent to 1.2 mg. of carbon dioxide per gram of cotton. From a comparison with the value of 2.4 mg. per gram for untreated cotton, it appears that only about 50 per cent of the pectic substance was removed by the alkali under these conditions.

(b) *Ammonium Hydroxide.* Dewaxed cotton lost only about 10 per cent of its pectic substance during extraction for 18 hours with a cold (0-3° C.) 2 per cent solution of ammonia. However, when the cotton was first de-ashed by one of two treatments, to be described later, the pectic substance was readily removed under the same conditions. The solubility of the pectic substance of de-ashed cotton is striking, and as will be shown in section 2, use may be made of the phenomenon to isolate the pectic substance from cotton fibers.

(c) *Water.* Cold water was found to be ineffective for removing pectic substance from native cotton while hot water was only slightly more effective. A sample of

*Thanks are due Drs. Robert W. Webb and Enoch Karrer of the Division of Cotton Marketing, United States Department of Agriculture, for making these measurements.

TABLE 1

The Amount of Carbon Dioxide Evolved, as a Function of Time, from Cotton Which Has Been Extracted for Different Lengths of Time with Boiling 1-Per Cent Solutions of Sodium Hydroxide

Duration of digestion with HCl	*Length of time of extraction with sodium hydroxide in hours*					
	0	1/6	½	2	4	7½
hrs.	*mg./g.*	*mg./g.*	*mg./g.*	*mg./g.*	*mg./g.*	*mg./g.*
1	1.43	0.29	0.13	0.09	0.15	0.30
2	2.35	0.49	0.23	0.23	0.35	...
3	2.81	0.64	0.47	0.59	0.56	0.60
4	3.16	0.85	0.73	0.78	0.76	0.78
5	3.45	1.09	1.06	1.09	1.01	1.00
6	3.74	1.38	1.36	1.33	1.28	1.29
7	4.04	1.70	1.64	1.60	1.58	1.60
8	4.33	2.01	1.88	1.91	1.87	1.85

dewaxed cotton, extracted with distilled water at 90 to 95° C. for 16 hours, yielded 2.1 mg. per g. of uronic acid-carbon dioxide. This is equivalent to a loss of approximately 12 per cent of pectic substance.

(d) *Ammonium Oxalate.* Ammonium oxalate solutions have been widely used as solvents for the extraction of pectic substance from fibers, fruits, etc. A sample of the dewaxed cotton was therefore subjected to two successive 8 hour extractions with 0.5 per cent solutions of this reagent at 75-80° C. The treated samples were washed with distilled water until oxalate ion could no longer be detected in the washings. Analyses of the treated material show that it retained only 0.3 mg. of uronic acid-carbon dioxide per gram, and that about 90 per cent of the pectic substance was removed by the above treatments.

(e) *Acetic Acid.* A boiling 1 per cent solution of acetic acid was found to remove less than 50 per cent of the pectic substance in 8 hours. On the other hand, cotton treated overnight with a 96 per cent solution of acetic acid* at room temperature for the purpose of lowering its ash content showed no loss in pectic substance.

(f) *Concentrated Hydrochloric Acid.* A sample of dewaxed cotton was allowed to stand at room temperature (about 30° C.) in a hydrochloric acid solution of sp. gr. 1.18 for 4 hours. During this treatment, the fibers were degraded to a fine meal which was difficult to filter from the acid solution. The separated material was washed with water until free of acid and air dried. Analyses of the residue indicated that it had lost only about 20 per cent of its pectic substance.

2. State of the Pectic Substance in Cotton Fibers

Although some naturally-occurring pectic substance is soluble in warm water, the modification most often encountered is not readily dissolved and appears to become soluble only after chemical treatment. The insoluble material as it exists in the native state has been termed protopectin[3]. This substance, on chemical treatment, is presumably converted to a soluble pectic substance. It is in respect to the nature of the insoluble form of pectin that many differences of opinion have arisen.

Some investigators[14, 15] believe that a pectin-cellulose compound exists, which must first be hydrolyzed, before extraction of the pectin is possible. For example, Carré[16] has shown that pectin from several sources appeared to be removed only after treatment with hot dilute acids such as 0.01 *N* hydrochloric or 0.5 per cent solutions of oxalic or citric acids. Others[17, 18] have suggested that natural pectin occurs in combination with certain metallic ions as insoluble salts. In support of this is the finding that calcium pectate is one of the constituents of the middle lamella of plant tissues[19].

The results described below as well as those of a separate investigation† on the acidic properties of cotton fibers indicate that a pectin-cellulose compound does not exist in raw cotton fibers and that the pectic substance is present on the fibers as insoluble salts of such polyvalent ions as calcium, magnesium, and iron[20]. If such a conclusion is correct, it should be possible to convert the native, insoluble pectic substance in cotton to the soluble form without hydrolysis or other degradation, simply by substituting monovalent cations, such as sodium or ammonium, for the polyvalent cations mentioned above.

As has previously been mentioned, ammonium oxalate solutions have frequently been used by a number of investigators for the purpose of removing pectic substance from cotton fibers. Presumably, the pectic substance is converted to a soluble form by a process of double decomposition. Unfortunately, this evidence has not been considered conclusive since the extraction process is carried out at elevated temperatures, and the experiments are therefore open to the criticism that some hydrolysis of the pectic substance may have occurred.

The pectic substance can be removed, however, at low temperatures where the possibilities for hydrolysis are at a minimum. In section 1-b, it was shown that cold (0-3° C.), dilute solutions of ammonia had very little solvent effect on the pectic substance of dewaxed cotton, but that after the fiber had undergone treatments which removed the ash, the solubility of this substance was greatly increased in the same reagent.

The ash was readily removed, either by extraction with a 96 per cent solution of acetic acid or by electrodialysis in distilled water. The ash-free fiber was allowed to stand overnight in a 2 per cent solution of ammonia at 0 to 3° C. Analysis of the treated material showed that about 90 per cent of the pectic substance had been removed. Although there was no evidence of hydrolysis when the 96 per cent acetic acid was used, this procedure may still be open to the same criticism given for the use of ammonium oxalate. This criticism is least applicable to the electrodialysis method of removal of ash, yet the pectic substance from samples so treated was as readily removed as from samples treated with 96 per cent acetic acid. The ease with which the pectic substance is removed from de-ashed cotton was even more strikingly demonstrated in titration experiments, where it was shown that removal of this substance begins when only very small amounts of dilute alkali have been added and the pH of the solution still remains on the acid side of neutrality.

It appeared that it would be of some interest to isolate the pectic substance removed from the de-ashed fibers and compare it with a sample of the material obtained by the commonly used ammonium oxalate method. The material was recovered by the following procedure. The ammoniacal extract was made acid with hydrochloric acid, whereupon a large proportion of the pectic substance precipitated and was removed by filtration. The filtrate was neutralized and concentrated at 40° C. under reduced pressure to a small volume, and the remainder of the pectic substance precipitated by pouring the concentrate into an excess of cold ethanol. The precipitates were combined, dissolved

*This concentration was suggested by Dr. C. B. Purves, of the Massachusetts Institute of Technology, since he had found that with higher concentrations of acetic acid, some acetylation of the fiber occurred.

†The results of this investigation are being prepared for publication.

in hot water, and dialyzed for 24 hours. The material was again precipitated by pouring the dialyzed solution into cold ethanol. The precipitate was then filtered off, washed with ethanol and with acetone, and finally dried in air. A comparison of the material with a sample of pectic substance obtained by the ammonium oxalate method is given in Table 2. The values for the uronic acid-carbon dioxide contents of both samples are in good agreement. The fluidity of the sample obtained by the ammonium oxalate treatment is a little higher and is suggestive of the possibility that a small amount of hydrolysis of the pectic substance prepared by this method had occurred.

3. Relation of the Pectic Substance to Properties of Cotton Fibers

The ease with which the pectic substance is removed from de-ashed cotton fibers, as indicated in the preceding section, strongly suggests that a chemical union between the pectic substance and the cellulose does not exist. Furthermore, it would be expected that if such a combination did exist, removal of the pectic substance would require chemical cleavage of covalent linkages which might result in an alteration of the properties of the fibers. That this does not appear to be the case is shown by the data in Table 3 which relate the pectic content to the tensile strength, copper number, and fluidity in cuprammonium hydroxide solutions of the cotton.

In agreement with the results of earlier workers[21], it may be seen that there is a relationship between the decrease in tensile strength and the increase in cuprammonium hydroxide fluidity. The most striking feature of these data, however, is found in the comparison of the properties of the fibers which had been treated with reagents such as ammonium oxalate or sodium hydroxide with those of fibers treated with acetic or hydrochloric acids. Cotton fibers, freed from pectic substance by boiling in a 1 per cent solution of sodium hydroxide for 2 hours exhibited tensile strengths which indicated that no damage had been done to them. Similarly the tensile strength remained unchanged in those fibers from which most of the pectic substance was removed by ammonium oxalate extraction. These treatments appeared to effect an almost negligible increase in fluidity.

On the other hand, treatments with acetic or hydrochloric acid removed much smaller amounts of the pectic substance but produced appreciable changes in tensile strength and fluidity. This was especially noticeable in the sample treated with concentrated hydrochloric acid. The fiber structure was completely destroyed, yet the material lost only about 20 per cent of its content of uronic acids. It might be argued, of course, that the hydrochloric acid had destroyed the structure of the pectic substance. Although quantitative evidence is lacking, qualitative examination of a sample of pectic substance, isolated from cotton fibers which had been treated with concentrated hydrochloric acid as described in section 1, showed that it still retained its gelatinous structure and appeared in many ways to be similar to pectic substance isolated by much less drastic methods.

4. Behavior of Cotton Fibers in Cuprammonium Hydroxide Solutions

During the preparation of the cuprammonium hydroxide solutions of cotton fibers for fluidity measurements, it was observed that solutions of dewaxed cotton always showed a slight cloudiness, whereas solutions of cotton purified by treatment with a boiling 1 per cent solution of sodium hydroxide (see Section 1-a) were clear. An examination* of the solution under the microscope revealed the presence of an insoluble material having the appearance of the outer shell of the fiber. No such solid residue could be detected in solutions of the purified cotton. When the cloudy solutions were centrifuged, a small amount of insoluble material was precipitated and the solution became clear.

*The results of this investigation are being prepared for publication.

TABLE 2

Comparison of a Sample of Pectic Substance, Obtained by Extraction of De-ashed Cotton with Dilute Ammonia Solutions at 0-3° C., with That Obtained from Dewaxed Cotton by the Ammonium Oxalate Method

Method of isolation of pectic substance	*Uronic acid-carbon dioxide*	*Fluidity of 0.5% aqueous solutions adjusted to pH 8.1 (temperature 21° C.)*
	Per Cent	*Rhes.*
Ammoninum oxalate	20.8	23
Ammonia	21.1	20

TABLE 3

Relation of Pectic Substance Content of Cotton to Some of the Properties of the Fiber

Treatment	*Content of pectic substance*	*Tensile strength*	*Fluidity*	*Copper Number*
	Per Cent	*1,000 lbs./sq. inch*	*Rhes.*	
1. Dewaxed cotton	1.15	89.3	0.95	.18
2. 0.5 per cent ammonium oxalate at 75-80° C. for 16 hours	0.14	89.8	1.1	.02
3. Boiling 1 per cent sodium hydroxide for 2 hours	0.00	94.2	1.4	.01
4. Concentrated hydrochloric acid (sp. gr. 1.18) at 30° C. for 4 hours	0.92	0.0	49.0	2.15
5. Boiling 1 per cent acetic acid for 8 hours	.60	86.7	5.7	.20
6. Electrodialyzed	1.15	100.2	1.4	.02
7. Electrodialyzed sample treated with 2 per cent ammonia at 0-3° C. for 15 hours	.19	97.7	1.4	.02

In order to study the phenomenon further, and to determine the nature of this precipitate, 28.5 g. of dewaxed cotton was dissolved, by shaking for 20 hours, in 4 liters of cuprammonium hydroxide solution A. The resulting cloudy solution was centrifuged until it was practically clear. The precipitate represented 3.22 per cent of the original cotton sample. On analysis, a sample of the precipitate gave the carbon dioxide-rate curve characteristic of uronic acids and yielded 58 mg. of carbon dioxide per gram. From this value it was estimated that 28 per cent of the precipitate was pectic substance and that this accounted for about 70 per cent of the pectic substance in the original sample of dewaxed cotton. When the precipitate was tested with ruthenium red[22] a considerable portion of it was stained red, which indicates the presence of pectic substance. With the iodine-sulfuric acid test, a portion of the material gave a blue color similar to that obtained with cellulose.

The relatively high percentage of pectic substance in the precipitate and the recovery of such a large proportion of the pectic substance of the dewaxed cotton were indeed striking. Since, however, some cellulose appeared to be present in the precipitate, the question immediately arose whether the precipitate was a stable cellulose-pectin compound or whether the pectic substance was contaminated, either with undissolved cellulose or with occluded, dissolved material. Some of the latter was undoubtedly always present since a small portion of the cuprammonium solution was always retained by the precipitate. Although the evidence presented in sections 2 and 3 indicated that a compound of pectic substance and cellulose did not exist, it, nevertheless, seemed advisable to further investigate the nature of the precipitate obtained in this experiment.

Accordingly, the precipitate was resuspended in 200 ml. of fresh cuprammonium hydroxide solution and the mixture allowed to stand for 24 hours, after which the insoluble portion was again removed by centrifuging. This procedure was repeated three times and the final precipitate was then washed with dilute acetic acid, followed by successive washings with acetone and with benzene. The product yielded 150.3 mg. of carbon dioxide per gram, which indicated that the bulk of the cellulosic material had been removed and that the residue consisted largely of pectic substance.

The material which remained in the cuprammonium hydroxide solution originally used to dissolve the dewaxed cotton, was precipitated by adding sufficient cold, dilute hydrochloric acid to bring the solution to neutrality. The precipitate was immediately washed with water and acetone, and then dried. On analysis the material gave a carbon dioxide-rate curve identical with that of glucose or cuprammonium rayon[4], which indicated the absence of detectable amounts of uronic acids.

In order to determine whether the concentrations of copper or ammonia in the cuprammonium hydroxide solutions had special solubility effects with respect to the pectic substance, the same experiments described above were repeated, using cuprammonium hydroxide solution B. On shaking dewaxed cotton (calculated to form 0.5 per cent dispersion) with this solution, the cellulose quickly dispersed, leaving suspended in the mixture numerous bits of insoluble material, which under the microscope appeared to be identical with those described in the previous experiment. Since this cuprammonium hydroxide solution has a greater density than that used in the previous experiment, the insoluble material was somewhat more difficult to remove during centrifuging and a smaller yield was obtained. The material was further purified with fresh cuprammonium hydroxide solution as previously described. The final precipitate was stained a deep red with ruthenium red and was found to yield 153 mg. per gram of uronic acid-carbon dioxide, which indicated again, that the fraction insoluble in cuprammonium hydroxide solutions, is principally pectic substance.

Finally, the same experiment was done with cotton which had been treated for 4 hours with hydrochloric acid (sp. gr. 1.18). This treatment is similar to that which Farr[23] states will remove the cementing material, of which one component, it is further stated, is the pectic fraction of cotton fibers. As in the previous experiments, a fraction insoluble in cuprammonium hydroxide solution was obtained, and accounted for a large proportion of the pectic substance of the original fiber. On further purification of this fraction with fresh cuprammonium hydroxide solution, a product was obtained which yielded 164 mg. of carbon dioxide per gram. Qualitative examination of the final precipitate showed that it retained its gelatinous structure and appeared to be similar to the pectic substance isolated by other procedures.

A consideration of the results of the above experiments, as well as those shown in Table 3, leads to the conclusion that the pectic substance does not contribute to the viscosity of cuprammonium hydroxide dispersions of cotton fibers. Further evidence supporting this conclusion was obtained by shaking a 0.1-gm. sample* of pectic substance, isolated from cotton, as well as similar amounts of commercial preparations of pectin† and pectic acid** in 20-ml. portions of cuprammonium hydroxide solution A for 4 days. At the end of this time, none of the materials appeared to have dissolved. Fluidity measurements of the cuprammonium hydroxide solution to which had been added the pectic substance from cotton showed it to be identical with the original cuprammonium hydroxide solution.

IV. REFERENCES

[1]D. B. Anderson and T. Kerr, Ind. Eng. Chem. *30*, 48 (1938).

[2]W. K. Farr and S. H. Eckerson, Contrib. Boyce Thompson Institute *6*, 189 (1934).

[3]American Chemical Society Committee on Nomenclature of Pectin of the Agriculture Food Division. Definitions. J. Am. Chem. Soc. *49*, Proc. 37 (1927).

[4]R. L. Whistler, A. R. Martin and M. Harris, J. Research NBS *24*, 13 (1940) RP1268.

[5]TAPPI, T430m.

*This is approximately 100 times as much pectic substance as would be present in a regular fluidity determination of cotton.

†California Fruit Growers Exchange.

**Eastman Kodak Company.

[6]D. A. Clibbens and A. Geake, J. Textile Inst. *15*, 27T (1924).
[7]R. T. Mease, J. Research NBS *22*, 271 (1939) RP1179.
[8]Report of the Fabrics Research Committee, Department of Scientific and Industrial Research, His Majesty's Stationary Office, London (1933).
[9]D. A. Clibbens and A. Geake, J. Textile Inst. *19*, T77 (1928).
[10]American Chemical Society. Committee on the Viscosity of Cellulose of the Division of Cellulose Chemistry. Ind. Eng. Chem. Anal. Ed. *1*, 49 (1929).
[11]H. B. Richardson, T. L. W. Bailey and C. M. Conrad, U. S. Dept. Agric. Tech. Bull. No. 545, 1 (1937).
[12]A. B. Corey and H. L. Gray, Ind. Eng. Chem. *16*, 853 (1924).
[13]R. K. Worner and R. T. Mease, J. Research NBS *21*, 609 (1938) RP1146.
[14]T. von Fellenberg, Biochem. Z. *85*, 118 (1918).
[15]R. Sucharipa, J. Am. Chem. Soc. *46*, 145 (1924).
[16]M. T. Carré, Biochem. J. *19*, 257 (1925).
[17]D. R. Nanji, F. T. Paton and A. R. Long, J. Soc. Chem. Ind. *44*, 253T (1925).
[18]W. Kopaczewski, Bull. Soc. Chem. Biol. *7*, 419 (1925).
[19]R. M. Tupper-Carey and J. H. Priestly, Proc. Royal Soc. B. *95*, 109 (1923).
[20]A. C. Walker and M. H. Quell, J. Textile Inst. *24*, T131 (1933).
[21]D. A. Clibbens and B. P. Ridge, J. Textile Inst. *19*, T394 (1928).
[22]L. Mangin, Compt. rend. *116*, 653 (1893).
[23]W. K. Farr, Contrib. Boyce Thompson Inst., *10*, 71 (1938).

TRADE NOTES • NEW PRODUCTS

• 125th ANNIVERSARY

In commemoration of its 125th anniversary of continuous service to American industry, Arnold, Hoffman & Co., Inc., Providence, R. I., has had prepared a medallion in the design of which the sculptor has portrayed the past and future of the chemical industry. The theme is expressed as: "Chemical Research for Peace, Health and Plenty." A pamphlet has also been issued which gives many facts of interest concerning the industrial growth of this country. A portion of it reads as follows:

"In celebrating 125 years of continuous service, we recognize that while such business stability is rare, the long service particularly represents an ability to look forward, and Arnold, Hoffman & Co., Inc., has been fortunate in the past in playing a leading part in the introduction of American manufacture of alkalies and bleaches and in promoting the textile uses of starches, gums and oils. Today with organic chemistry research as a basis, synthetic products offer a vast contrast to the natural extracted colors, shading salts, the soaps, raw vegetable oils and flour which were the textile finishes of 1815, when this firm was first established. In its earlier days a large share of the indigo trade was handled by Arnold, Hoffman & Co., Inc.

"The securing of peace by means of an efficient national industry, and the importance of a chemical industry as a cognate part was probably first set forth by the first meeting of American chemical manufacturers in 1831. At that time, although 30 firms were involved, the value of the products of all of them was far short of the present day volume of business handled by Arnold, Hoffman & Co., Inc."

In 1815, the population of this country was only eight million; the war of 1812 ended early in the year; James Madison was president; delayed capital expenditures followed the removal of the British blockade and the industries started only a few years earlier, retook the foreign trade gained during the Napoleonic wars; demands for supplies rose rapidly from the large migration of settlers over the Appalachians; our banking system was started; Gilmore added the first power loom affecting the rapid industrial development and resulting in the start of the American factory system; the use of cotton increased from 1,000 bales in 1805 to 90,000 bales in 1815; Dr. W. C. Bowen, a chemist at Brown University in 1813 was endeavoring to perfect bleaching liquors. Many changes in the American industrial picture have taken place since 1815. The pamphlet concludes as follows:

"Chemical research has gone far, but it has only started compared with its possibilities; possibilities which bring not only improved quality but through lower costs, will make available the improved quality and new pleasures to more people. To the development of these possibilities in the chemical field, Arnold, Hoffman & Co., Inc., will apply itself with the best of facilities and talent and with the continued support of old and new friends, looks forward into a future for all of peace, health and plenty."

The company now offers over two thousand different products and the volume of business during the past 25 years years exceeds that of the previous century.

• CRUSH RESISTANCE

Rohm & Haas Co., Inc., 222 West Washington Square, Philadelphia, Pa., has recently released a booklet entitled "Crush Resistance of Textile Fabrics." An enclosure with the booklet states: "Resin treatment for crush resistance represents an important advance in textile finishing. Each year the process is being employed for an increasing variety of fabrics. Our efforts in developing products and improving methods have contributed much to the popularity of the process. The best methods for obtaining the crush resistant effect have been evolved after hundreds of plant trials under varying conditions with a wide range of fabrics."

The information gathered in these trials is summarized in the booklet. Copies are available upon request.

• NAPTHOLE RELEASES

Napthole, Inc., 416 Division Street, Boonton, N. J., has recently released a pamphlet describing the following products:

Naptex—a high-penetrant emulsifying detergent. It is said to do the work of both scouring agent and soap.

Quix—a supersulfated dye assistant and penetrant. The field of application is said to cover all phases of wet finishing.

Luxolene Finishes—a purely domestic, water soluble oil produced by original synthetic means. Advantages claimed for these finishes include: new processing methods from raw material to finished product; objectionable odors are not created on finished goods even after long storage; white grounds are preserved on print goods and material is not yellowed; the finishes are suitable for delicate color shades and intricate print designs, improving the snap and brilliancy of the pattern.

Copies of the leaflet are available upon request.

• COLOR CHART

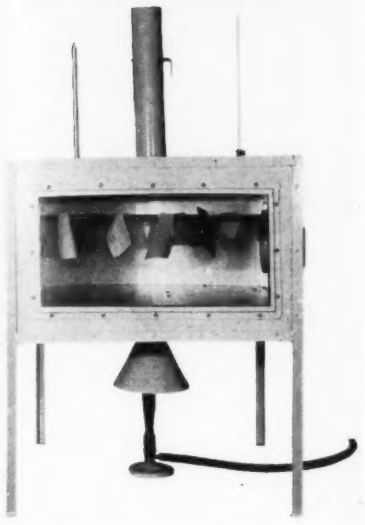
American Aniline Products, Inc., are releasing a combination Amapro Union and Celanese color chart to meet the demands of the trade for a card suitable for use on store counters and for route men and same are available at the nominal charge of 40 cents each. They are available through the New York and Chicago offices and can also be obtained from distributors.

• DEGUMMING POWDER

A new degumming powder for silk hosiery has recently been announced by Laurel Soap Mfg. Co., Inc., 2604 E. Tioga Street, Philadelphia. The new product, known as Laurel Degumming Powder No. 433, may be used in either the single or split bath method with the usual dyeing procedure. It is said to give a quick boil-off, aids leveling of neutral dyeing acid colors, leaves goods in elastic condition and prevents formation of spots in the degumming or dyebath.

• CHAMBER FOR GAS FADING TESTS

After several years of research and development work, the United States Testing Company has devised a combustion cham-



Gas Fading Chamber

ber for testing acetate rayon fabrics for their resistance to atmospheric fading.

There are many types of apparatus in use today for conducting these tests. The majority, if not all, employ the use of the combustion fumes of an illuminating gas burner. It is fumes of this nature which produce this troublesome fading. Such fumes are present in the atmosphere, being produced not only from the combustion of illuminating gas but from heating plants and chimney flues.

The United States Testing Company's new gas fading chamber is so designed as to control the flow of the combusted gases, the exhaustion of the fumes, and the temperature. By means of a series of baffles and drafts, a uniform concentration of the gas acid fumes that cause this color change is said to be insured.

• DU PONT RELEASES

A new series of water-soluble vinyl resins, the polyvinyl alcohols, announced by E. I. du Pont de Nemours & Company, suggest a wide range of applications to the dyestuffs field, as well as to other industries. The material, designated as PVA, has now passed the laboratory development stage and is available in commercial quantities.

Solutions of the material are said to be powerful adhesives for binding particles of pigments and other solids into the base. In dyeing leather, for example, the film-forming properties of the resin and rapid penetrating characteristics are said to commend it as an effective vehicle for basic dyestuffs. In general, PVA solutions have strong dispersing power and are neutral in character.

Films formed of the material may be employed to advantage in dyeing, by capitalizing on its water solubility. Weighted units of the dyestuff are encased in the film and added to water.

PVA is available in a number of grades, since it has been found that proper selection should be made to meet individual requirements. Polyvinyl alcohols are white to creamy white powders, odorless and tasteless. They may be molded, extruded, or formed into films. The films are said to be very strong and are formed from water solution, eliminating the need for toxic or inflammable solvents. If desired, the films can be made quite resistant to water. They are unaffected by oils, greases, fats, hydrocarbons and most of the ordinary organic solvents.

A new technical bulletin, describing the physical and chemical properties of these compounds and the various methods of use, is now being distributed by the R. & H. Chemicals Department, E. I. du Pont de Nemours & Company, Wilmington, Del.

• TEXTILE ABRASER

The Model JF Textile Abraser is a precision testing instrument for determining wear quality of woven fabrics ranging from heavy wool overcoating to sheer silk hosiery.

The test is based on the use of dual resilient wheels of standard composition which provides a unique wearing action resulting from the two wheels alternately rubbing back and forth and at the same time crisscross their paths approximating actual conditions of use.

A constant rate of wear is said to be obtained through careful design and accurate construction of the instrument, insuring standardized, reproducible test readings. An interesting bulletin is available on request from the Taber Instrument Company, North Tonawanda, N. Y., or from Alfred Suter, Textile Engineer, 200 Fifth Avenue, New York, N. Y.

• JOINS QUAKER

J. C. Pirkle will represent Quaker Chemical Products Corp. in the textile industry in North Carolina in the capacity of technical sales and service.

Mr. Pirkle was recently general superintendent of Faytex Mills, Inc., Fayettsville, N. C., and formerly was overseer of carding and spinning at Georgia Manufacturing Company, Whitehall, Ga., for about three years; superintendent of one of the Avondale Mills, Alabama, for two and a half years; and more recently was plant superintendent of the Stonewall Cotton Mills, Stonewall, Mississippi.

• CHEMICAL EXPORTS

Exports from the United States of chemicals and related products in March continued the advance which has been noted since the beginning of the current year, bringing the total value for the first quarter to $61,000,000 compared with $37,500,000 for the corresponding months of 1939, according to C. C. Concannon, Chief, Chemical Division, Bureau of Foreign and Domestic Commerce.

Practically every item and classification making up the chemical export list shared in the gain, some recording advances up to 250 per cent and better. Increases being recorded during the current year have been due to heavier demand from every part of the world, particularly those areas outside the European war zones.

The outstanding percentage increase during the first quarter was recorded in exports of coal-tar products, and industrial chemicals registered the largest dollar gain.

Exports of coal-tar products were valued at $7,855,600 in the first quarter against $2,919,000 in the first three months of 1939. In this group, shipments of colors, dyes, and stains increased 268 per cent in quantity to 7,841,350 pounds, and 240 per cent in value to $3,561,500.

• LAUREL HOSIERY FINISHES

Laurel Soap Mfg. Co., Inc., 2604 E. Tioga Street, Philadelphia, has announced four new finishes developed for processing nylon hosiery: (1) Laurel Nynit C, a lubricant and conditioner which is said to yield better knitting and an even stitch and prevent sticking in preboarding operation; (2) Laurel Supergel TB, a scour, which is said to remove size, grease and dirt and leave hosiery clean, ready for dyebath; (3) Laurezol No. 6, dispersing agent which is said to increase penetration and aid production of level shades; (4) Laurel Peramel, a permanent finish, which is said to impart smooth desirable body and withstand repeated washings.

These products, developed for nylon hosiery, are said to have stood practical mill and dyehouse tests and are giving satisfactory results on the present form of nylon.

• SPUN RAYON SIZING RESEARCH

Encouraged by the results of the open conference on the warp sizing of spun rayon, which was held Saturday, April 20, at State College Textile School, Raleigh, N. C., the administrative committee for this study has decided to start active research work, with F. Gordon Cobb as research associate, just as soon as a few remaining details of the program are decided and a miniature slasher for experimental work is delivered.

The conference was held under the auspices of U. S. Institute for Textile Research and was called by Carl R. Harris, manufacturing engineer, Erwin Cotton Mills Co., chairman of the administrative committee for the research, to complete the program and to enable non-subscribing mills and supply companies to learn at first hand of the plans and objectives. Although many of the present subscribers were unable to be present there was a registered attendance of 49, and this was increased by some 25 textile students.

Dean Thomas Nelson, who is a member of the administrative committee, was prevented by sickness from attending, and Albert H. Grimshaw, professor of textile chemistry and dyeing, substituted for him in an address of welcome at the morning session. Chairman Harris presided at both morning and afternoon sessions. The speakers at the morning session were W. D. Appel, chairman of the Institute's Research Council and Chief, Textile Section, National Bureau of Standards, who explained the purpose of the meeting, described the Institute's cooperative research method and its value to cooperators, and gave an outline history of the warp sizing program to date. Mr. Cobb presented a list of questions for discussion at the afternoon session which were supplementary to the tentative research program.

Following luncheon at the college cafeteria there was a tour of inspection, under the guidance of Prof. Grimshaw, of the rooms of the new Textile School building that will be available for this research work, and of the photographic, microscopic and other testing equipment, and the new slasher and weave room. The afternoon session was opened with a formal address of welcome on behalf of North Carolina State College by Colonel J. W. Harrelson, Dean of Administration. The discussion was then led by Dr. W. E. Yelland and Harold M. Chase. Both are members of the administrative committee, Dr. Yelland having been director of the Institute's completed warp sizing study, now being with the Research Laboratory of Corn Products Refining Co., and Mr. Chase being chief chemist, Riverside and Dan River Cotton Mills. Both speakers outlined the various factors to be studied as given in the tentative program. While no changes were suggested in the discussion that followed, it was indicated by the interest shown in spun acetate and blends of that fiber with cotton and wool that the program should be expanded to cover those fibres. The afternoon session adjourned at 4:30 P.M. The revised program resulting from this conference will be submitted to subscribers for further suggestions, and it is hoped that these replies and final plans will be completed in time to start work not later than the first of June.

• COTTON RESEARCH

A plea for the cotton textile industry to make possible the continuation of the research of the Textile Foundation was made on April 27th, by Dr. R. E. Rose, Director of the Dyestuffs Technical Laboratory of E. I. du Pont de Nemours & Company, before the meeting of the American Cotton Manufacturers Association at White Sulphur Springs, W. Va.

The Textile Foundation laboratory is not self-perpetuating and its research program will come to an end unless supported by the cotton textile industry, Dr. Rose said.

Dr. Rose is chairman of the Advisory Committee for Scientific Research of the Textile Foundation and a past president of the American Association of Textile Chemists and Colorists.

The speaker urged the industry to appoint a committee to investigate the work of the laboratory, believing that their committee would approve the continuation of the work through their financial support.

"As a result of some of the many complicated trade situations that arose out of the last war, a large sum of money was collected, that was in a sense the property of the textile industry as a whole. In order to make this available in a totally noncompetitive way, the Textile Foundation was created by Congress for its administration."

The Foundation's budget was $40,000 annually for five years, the sum to be devoted half to cotton and half to wool and silk, Dr. Rose said.

"I am very sorry to tell you that this laboratory, costing actually only $20,000 a year for cotton research, but costing you nothing, is not going to be self-perpetuating. It can only continue if it is supported by the active participation of yourselves. In a few short years the funds available will be depleted and the effort will cease. In proportion to what you spend, its continuance would cost you so little as to be an insignificant outlay.

"I urge upon you the necessity for you to carry on research in your own interests unrelated to the group of suppliers of textile materials and equipment. It is an undertaking that you cannot afford to ignore without ignoring some of the most advantageous improvements you can make.

"Research is not a production matter; you cannot go to your laboratory and say 'We have orders for such and such new product, we expect you to make it in time for delivery 60 days from now.'

"The results of research are like choice liquors, they are useless until needed and they cost a lot but when they are wanted they must be available, they cannot be produced overnight.

"Do not ask me to tell you what these results obtained up to the present are; they have no particular meaning in terms of what you think you need, but let me assure you that the money is being well spent and that some day, perhaps much sooner than we expect, the knowledge gained will be of commercial importance, but in the meantime must be considered a very valuable latent asset."

Dr. Rose urged the industry specifically to consult Dr. Milton Harris, in charge of the research work of the Textile Foundation and obtain from him an idea of the importance of the work and the amount of money needed to support it.

"I honestly believe that I am trying to make you a present of gold dollars for a few cents each. Consider the investment as the installation of a small piece of up-to-date equipment and you will see how very small the risk—the profit, if you have patience, will speak for itself, and so vehemently that the date at which your support made certain the continued life of this laboratory will come to be known as a most significant one in the history of American Cotton Mills."

• NEW WRINKLE CONFERENCE

A technical production conference will be sponsored by New Wrinkle, Inc., at Dayton, Ohio, May 17 and 18. A two-day laboratory meeting will be held for the purpose of acquainting its licensees' production superintendents with New Wrinkle's latest developments, and, from advance registrations, some one hundred to one hundred and fifty technical men are expected to attend.

The first day's program at the laboratory is to include demonstrations of the formulation, manufacture and application of Wrinkle finishes of both the alkyd and varnish types. The technique of texture, tone, drying time, flexibility, pigmentation and the production of Wrinkles for special purpose uses will be covered in a practical way, and data presented those attending which should prove of interest and value in solving their own problems. Raw materials will also be shown and discussed insofar as their use in Wrinkle enamels is concerned, as will various new items of manufacturing equipment especially suited to Wrinkle production.

A short inspection trip will be made through one of Dayton's largest factories where Wrinkle is used in tremendous quantities. The technical men will thus have an opportunity of viewing the application of Wrinkle under production line methods.

That evening, following an informal dinner, planned at the Dayton Engineers' Club, an open meeting will be held in the auditorium where further demonstrations are contemplated.

On Saturday, sessions at New Wrinkle's laboratory will be continued. While the first day's work will be confined largely to fundamentals, the next day is to be devoted to an exposition of the experimental developments upon which New Wrinkle, Inc. has been engaged. Incidentally, in this regard it may be of interest to learn that New Wrinkle, Inc. has more patent applications granted and pending in connection with wrinkles than were filed prior to its organization a little over two years ago. Some of the more important subjects to be covered the second day include Tung Oil substitutes, infra red drying lamps and reflectors, "Wrintex" (a new resin), so-called air-drying Wrinkles for use on flexible materials and other special applications.

Time will be arranged for the discussion of any practical problems in connection with

the formulation, manufacture and application of Wrinkles which may be presented. It is also intended to keep all the meetings on a most informal basis by permitting those who so desire to participate in the demonstrations or to duplicate them at the time or later, as they may prefer. Formulae and other data covering any procedures shown or discussed will, of course, be made available.

• TESTING COMPANY ELECTION

At the annual meeting of stock holders of the United States Testing Company, Inc., held in the offices of the company on Wednesday, April 24, 1940, the following 12 members of the Board of Directors will continue in office for another term, and five new Directors elected.

The members of the Board continued for an additional term are: J. P. T. Armstrong, D. E. Douty, Otto Froelicher, Joseph Gerli, James A. Goldsmith, Oscar Heineman, William H. Hubbard, Joseph Le Bauer, Walter H. Rossmassler, S. A. Salvage, E. J. Stehli and H. L. Van Praag.

The new members elected are: G. H. Gonze, President, Susquehanna Silk Mills, President, National Federation of Textiles; B. C. Dunlop, Vice President, American Bemberg Corp., Vice President, North American Rayon Corp.; Kiycshi Miyazaki, New York Manager, Mitsui & Co., Ltd.; A. L. Brassell, United States Testing Company, Inc.; Charles J. Huber, United States Testing Company, Inc.

At a Director's meeting held the same day, Wednesday, April 24th, the following officers were duly elected: Chairman of the Board, E. J. Stehli; President and Chairman of Ex. Comm., D. E. Douty; Vice Presidents, A. L. Brassell, Charles J. Huber; Treasurer, E. C. Brown; Secretary, Ramsay Peugnet; Asst. Secretary and Asst. Treasurer, S. B. Walker.

Mr. Douty, President of the Testing Company, reviewed the growth of the company in recent years and submitted a yearly report for 1939 for approval.

Mr. Douty pointed out the company's business for 1939 showed considerable gain over that of 1938 and further reported that for the first quarter of 1940 the indications were that we could expect a business during the first half of 1940 comparable with the last half of 1939 which had been very satisfactory.

• CIBA RELEASES

The following circulars and sample card have been issued by the Ciba Co., Inc., illustrating new products and processes.

Circular No. 515—features Chrome Fast Blue BG, also named Synchromate Blue BG; Chrome Fast Blue B2G, also named Synchromate Blue B2G; Chrome Fast Blue 2RB, also named Synchromate Blue 2RB. These are dyed on wool by the regular chrome processes, viz. chrome mordant, after-chroming and by use of Synchromate mordant in the one-bath process. The dyeings made in either manner are said to have very good fastness to light, washing, water, sea water, perspiration, decatizing, potting (crabbing), alkalies and acids, as well as a good to very good fastness to fulling. The dyestuffs are adapted for the dyeing of wool at any stage of manufacture. To increase the brilliancy of the tones, Chrome Fast Pure Blue B and Naphthochrome Violet R may be used. Cotton effects are slightly tinted by the after-chrome or Synchromate processes, viscose rayon is reserved in the after-chroming process, but somewhat tinted by the Synchromate method. Acetate rayon is tinted. Half-wool unions and mixed fabrics of wool and staple fiber are advantageously dyed in a one-bath process, in combination with direct dyes resistant to chroming and also fast to light, or with Diazo Fast Blue types, which are subsequently diazotized and developed. Chrome Fast Blue 2RB is suited for Vigoreux printing. All three types are suited for colored discharges.

Circular No. 520—brings to attention Coprantine Brown RL, a new addition to the recently introduced series of Coprantine colors, which are dyed like direct dyestuffs, but with Coprantine Salt I in the dyebath. The principal features of this series are said to be very good fastness to washing and light. Coprantine Brown RL is suited for the dyeing of loose cotton, yarns and pieces, also viscose rayon and cut staple. This type may be combined with the Coprantine Blues GLL and RLL. Viscose with unequal affinity for dyes is not improved. Mixtures of cotton and viscose rayon dye with a redder shade on the rayon. Dyeings of Coprantine Brown RL are not discharged to a perfect white, yet are well suited for colored discharges.

Circular No. 522—introduces Cibacete Discharge Blue 3GN pat. and Cibacete Discharge Blue 3R pat., two new types for the dyeing of acetate rayon. The 3GN type is a clear greenish toned blue, dischargeable to a clear white and of notably greater tinctorial power than the old type Cibacete Discharge Blue 3G and replaces it advantageously. The 3GN is said to have moderate fastness to light but very good fastness to water, washing, perspiration and subliming. The 3R type is a clear red toned blue of good strength and very good dischargeability. The dyeings are said to have good fastness to light, very good fastness to washing, water, perspiration, sublimation and crocking. The 3R has also good exhaust and levelling properties; for complete exhaust the dyeing temperature is best kept near 180° F. It is stated that by means of these two new types in combination with the dischargeable Cibacete Yellow GN, GGR, Cibacete Orange 2R, 4R, Cibacete Scarlet G, BR, 2B, Cibacete Red GR, GGR, B, Cibacete Rubine R and Cibacete Discharge Violet 5R, it is possible to produce a range of dischargeable grounds which heretofore were only to be had by saponifying the acetate fiber and dyeing with dischargeable direct dyestuffs.

Sample Card No. 1551—treats of Cibanaphthols and bases in piece dyeing and printing, showing a selection of dyeings and prints said to have outstanding fastness properties. The application of naphthols and bases in piece dyeing and printing follows the general procedure of prepare with the naphtholate solution, drying and coupling with the diazo compound. In this way is obtained on the cellulosic fibers a great variety of dyeings and prints of brilliant tone and good fastness.

• VAT DYES AS PIGMENTS

Tests indicating possible application of vat dyes as pigments in a number of industrial fields were reported before the Spring meeting of the American Chemical Society by Crayton K. Black, Du Pont Company chemist.

The same properties which have become valuable as textile colors carry over into pigment work, Dr. Black pointed out. Neglected because of higher cost, he said, it now becomes apparent that "there are many places where vat dyes can be used to advantage in solving pigment difficulties."

The extreme light fastness of vat colors even in pale tints suggests their usefulness in wallpaper colors, cold water paint, printing inks, paper beaters and in lacquers, particularly of the automotive type, Dr. Black said. Possibilities in filling "certain gaps" in the line of pigments available for automobile finishes were discussed. Importance of proper physical form in pigment formulation was emphasized.

Dr. Black displayed a number of panels comparing vat dyes with other colors under identical exposure conditions. These contrasted, for example, the performance of a vat blue with iron blue, ultramarine and phthalocyanine.

"Despite a relatively high pigment cost," Dr. Black concluded, "vat dyes may assist in problems not easily solved without them. Particularly in the case of pale tints where only a small amount of vat color is required they may prove an economical solution."

• APPOINTED VICE PRESIDENT

Brooklyn Yarn Dye Co., Inc., dyers and bleachers of knitting yarns, Brooklyn, N. Y., has made known the appointment of Norman I. Stone as vice president of the company and as a member of its board of directors. Mr. Stone has been connected with Brooklyn Yarn Dye Co. for the past four years, both in plant management and sales capacities.

• OPEN FORUM •

Rules under which this department of the REPORTER is conducted are as follows:

1. Anyone who has a technical problem on which he would like advice may submit it to the Reporter and it will be published in the first available issue.

2. Any reader who feels that he has a solution of the problem may forward his reply to us and if we feel that the reply is suitable it will be published in a succeeding issue.

3. For each such reply published the Reporter will pay a minimum of $2.

4. In case there is more than one answer to the same question, the one covering the subject in the most complete and authentic manner will be published, or if two answers are sufficiently different both will be published. If two answers are considered equally good, the one first received will be given priority.

5. The Reporter will assume no responsibility whatsoever for the accuracy of the answers submitted—it is simply offering a vehicle for the public expression of its readers' opinions.

6. Both the questioner and answerer must send in his complete name and address. When requested we will publish only the initials or other identifying insignia.

50—Recently, yellow spots, similar to "link marks," have been appearing on our chlorine bleached cotton yarn. This yarn is boiled twelve hours in a pressure kier and then bleached in cement vats. The spots are quite heavy and appear only when the yarn is wet. After drying, the spots disappear completely and there is no recurrence of them if the yarn is wet out again. The spots strip easily but an ordinary wash has no effect on them.

Any information readers can give concerning the cause of these spots will be greatly appreciated.—**H. G. S.**

Answer—Relative to occurrence of yellow spots similar to "link marks" appearing on chlorine bleached cotton yarns: we have found these stains or link marks happen because of one fault, namely, poor packing or piling of the linked skeins due to drawn tight links. The chain is usually made up about 1 lb. and not exceeding 1-1/3 lbs. of yarn 54" reel per link. 1½ lbs. 60" reel. 1¾ lbs. 72" reel. If the fault occurs in kier boil, the natural stains are removed only by shifting, repacking and reboiling. If they occur in the chemic, they are readily removed by hydrosulfite strip (which is a mild bleach for kiered yarns) or rechemic.

When these stains are removed by soap, soda ash or trisodium phosphate washed at 160° F., fault is due to dirty water.

There are three important facts necessary for good chain bleaching:

1st—Water of distilled water clearness.

2nd—Trained employees or mechanical device to insure proper packing at all stages.

3rd—Bands of proper length, not too short or too long, and not too much or too little yarn per link.—**W. D. L.**

New Question

51—Raw silk, during the last few years, has been coming through with considerable exfoliation, known to the trade as "lousiness" and looks like little white flecks on the thread which does not take the dye, therefore, gives the thread a hairy or fuzzy appearance.

We would like to know of a way to clean the thread of such imperfections.—**L. B. B.**

• CLASSIFIED ADVERTISEMENTS •

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

POSITION WANTED: Sales engineer with eight years' experience in selling industrial automatic controls and drying equipment. Write Box No. 243, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

WANTED: Graduate chemist by supplier of textile auxiliaries, oils and finishes for trouble shooting and demonstration purposes. Must possess practical knowledge of dyeing and finishing. Must be between 30 and 35 years of age and possess pleasing personality. Send full particulars including salary desired in letter of application. Write Box No. 245, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

POSITION WANTED: Practical Textile Chemist—Ph.D. and Textile School—Fourteen years' experience—European and American—Manufacturing pile fabrics, silks. Looking for position as Assistant to Manufacturing or Sales Department. Write Box No. 246, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

POSITION WANTED: Practical Dye and Textile Chemist with wide experience in dyeing and printing all types rayon and silk fabrics desires another connection as chemist or superintendent, or with dye or textile chemical manufacturer. Write Box No. 247, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

Use Reporter Classified Advertisements for Results!